

Having thus described the invention, we claim:

CLAIMS

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1. A method for coating an outer surface of a product roller for an electrophotographic process with a seamless coating of a surface-modifying material, the method comprising:

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- a) applying a mixture containing the surface-modifying material to a rotatable gravure roller;
- b) rotating the product roller; and,
- c) rotating the gravure roller in mixture-transferring contact with the product roller transferring at least a portion of the mixture to the product roller.

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2. The method of Claim 1 wherein transfer of the mixture to the product roller is continued by continuing application of the surface-modifying material to the gravure roller and continuing rotation of the product roller until a selected quantity of surface-modifying material has been transferred to the outer surface of the product roller.

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3. The method of Claim 1 wherein the mixture of the surface modifying-material is a mixture or dispersion of the surface-modifying material in a volatile solvent.

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4. The method of Claim 2 wherein the surface-modifying material is selected from the group consisting of tetrafluoroethylene, fluorinated ethylene-propylene resins, polymers of chlorofluoro-ethylene, polyvinylidene fluoride, hexafluoropropylene, co-polymer of vinylidene fluoride and hexafluoropropylene.

5. The method of Claim 3 wherein the volatile solvent is a ketone having a boiling point at standard atmospheric pressure from about 50 to about 160°C.

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6. The method of Claim 1 wherein the mixture contains water or a blend of water with organic solvents and the surface-modifying material.
7. The method of Claim 1 wherein the mixture is applied to the gravure roller by immersing a portion of the gravure roller in the mixture.
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8. The method of Claim 1 wherein the mixture is applied to the gravure roller by spraying the mixture onto the gravure roller.
9. The method of Claim 1 wherein the product roller is a fuser roller, pressure roller, oil donor roller, intermediate transfer roller, primary charge roller, or a paper or other substrate handling roller.
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10. The method of Claim 1 wherein the gravure roller is in mixture-transferring contact with the product roller by mixture-transferring contact with an intermediate roller with the intermediate roller being in mixture-transferring contact with the product roller.
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11. A method for coating an outer surface of a product roller for an electrophotographic process with a seamless coating of a surface-modifying material, the method comprising:
 - a) positioning the product roller in surface-modifying material transfer contact with an application roller having a central axis and an outer surface and rotating the product roller and the application roller;
 - b) positioning a metering roller having a central axis and an outer surface and a central axis above and horizontally displaced from the central axis of the application roller so that a mixture containing the surface-modifying reservoir space is formed between the metering roller and the application roller and so that a selected spacing is present between the outer surface of the metering roller and the outer surface of the application roller; and,
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c) rotating the metering roller in an opposite direction to the rotation of the application roller to position a selected quantity of the mixture containing the surface-modifying material on the outer surface of the application roller so that at least a portion of the quantity of the mixture containing surface-modifying material is transferred to the product roller.

5 12. The method of Claim 11 wherein transfer of the mixture to the product roller is continued by continuing application of the surface-modifying material to the gravure roller and continuing rotation of the product roller until a selected quantity of surface-modifying material has been transferred to the outer surface of the product roller.

10 13. The method of Claim 11 wherein the mixture containing the surface modifying-material is a mixture or dispersion of the surface-modifying material in a volatile solvent.

15 14. The method of Claim 12 wherein the surface-modifying material is selected from the group consisting of tetrafluoroethylene, fluorinated ethylene-propylene resins, polymers of chlorofluoro-ethylene, polyvinylidene fluoride, hexafluoropropylene, co-polymers of vinylidene fluoride and hexafluoropropylene.

20 15. The method of Claim 13 wherein the solvent is a ketone having a boiling point at standard atmospheric pressure from about 50 to about 160°C.

25 16. The method of Claim 11 wherein the mixture contains water or a blend of water with organic solvents and the surface-modifying material.

17. A method for coating an outer surface of a product roller for an electrophotographic process with a seamless coating of a surface-modifying material, the method comprising:

- a) rotating the product roller; and,
- b) applying a mixture containing the surface-modifying material to the outer surface of the product roller at a controlled rate.

5 18. The method of Claim 17 wherein transfer of the mixture to the product roller is continued by continuing application of the surface-modifying material to the gravure roller and continuing rotation of the product roller until a selected quantity of surface-modifying material has been transferred to the outer surface of the product roller.

10 19. The method of Claim 17 wherein the mixture of the surface modifying-material is a mixture or dispersion of the surface-modifying material in a volatile solvent.

15 20. The method of Claim 19 wherein the surface-modifying material is selected from the group consisting of tetrafluoroethylene, fluorinated ethylene-propylene, resins, polymers of chlorofluoro-ethylene, polyvinylidene fluoride, hexafluoropropylene, co-polymer of vinylidene fluoride and hexafluoropropylene.

21. The method of Claim 19 wherein the solvent is a ketone having a boiling point at standard atmospheric pressure from 50 to about 160°C.

20 22. The method of Claim 17 wherein the mixture contains water or a blend of water with organic solvents and the surface-modifying material.

25 23. The method of Claim 17 wherein the mixture is ejected onto the outer surface of the product roller by using a slot die.

24. The method of Claim 17 wherein the mixture is applied at a selected rate as a falling curtain or ribbon of the mixture onto the product roller.

25. The method of Claim 17 wherein the mixture is applied to the product roller as a jet or as a spray.

26. A method for coating an outer surface of a product roller for an
5 electrophotographic process with a seamless coating of a surface-modifying material, the method comprising:

- a) providing a mixture containing the surface-modifying material;
- b) immersing the outer surface of the product roller in the mixture; and,
- c) withdrawing the product roller from the mixture at a controlled rate.

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27. The method of Claim 26 wherein the mixture containing the surface modifying-material is a mixture or dispersion of the surface-modifying material in a volatile solvent.

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28. The method of Claim 27 wherein the surface-modifying material is selected from the group consisting of tetrafluoroethylene, fluorinated ethylene-propylene resins, polymers of chlorofluoro-ethylene, polyvinylidene fluoride, hexafluoropropylene, co-polymers of vinylidene fluoride and hexafluoropropylene.

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29. The method of Claim 28 wherein the solvent is a ketone having a boiling point at standard atmospheric pressure from 50 to about 160°C.

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30. The method of Claim 26 wherein the concentration of the surface-modifying material in the mixture is adjusted to a concentration sufficient to provide a desired quantity of the surface-modifying material on the outer surface of the product roller upon withdrawing the product roller.

31. A method for coating a product roller for a electrophotographic process with a seamless coating of a surface-modifying material by a wet-on-wet method, the method comprising:

- 5 a) depositing a first coating of a mixture containing the surface-modifying materials on an exterior of the product roller; and,
- b) depositing at least one subsequent coating of the mixture onto the exterior o the product roller prior to drying the first coating.